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ABSTRACT

This monograph presents the state of the art of computer-assisted instruction for students in adult basic education (ABE), developmental education, and rehabilitation programs. The 12 articles are written by practitioners for practitioners and describe programs being provided by public schools, community colleges, libraries, volunteer agencies, and a rehabilitation facility in rural, suburban, and urban settings. Suggestions are offered as to what software programs have been effective with students, how cooperative programs between agencies are being implemented, how computer-assisted instruction supplements volunteer tutorial programs, and how rural areas with limited funding can use technology. Articles include the following: "The Computer-Assisted Literacy Center in the Duluth Public Library" (Kaufer); "Helping College-Level Learning Disabled Students through Computer-Assisted Instruction" (Frederickson); "Computer-Assisted Instruction as a Motivational Tool for Adult Learners and Management Tool for Instructors" (Eisenreich); "The Metro North Reading Lab: Enhancing Nontraditional Adult Learning" (Fedje); "The Use of Technology in Rural Minnesota ABE Programs" (Berg); "The City Mouse and the Country Mouse" (Willette); "Important Considerations in Educational Technology for Physical and Sensory Deprived Adults" (Strand); "Technology for the '90s: Where We're At; Where We're Going" (Bredemus); "Raise the Curtain" (Olson); "Notes from Minnesota's North Woods" (Arenz); "Literacy Software: Resources for ESL and Native Speakers" (Adkisson); and "PALS in Rochester" (Rabe). Appendixes list authors and addresses, software and hardware, and vendors. (YLB)

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Minnesota Association For Continuing Adult Education

Use of Technology in Adult Literacy:

Minnesota's Programs

Terilyn C. Turner
Elizabeth Frick

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Use of Technology in Adult Literacy: Minnesota's Programs

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Foreword

At the 1986 Annual Missouri Valley Adult Education (MVAEA) Conference held in Sioux Falls, South Dakota, Howard Hovland of South Dakota gave a contribution to the MCAEA which led to the creation of the MCAEA Development Fund. The Minnesota Association for Continuing Adult Education (MACAE) was the first recipient of the MVAEA Development Fund grant awarded in 1988. Benjamin F. Bryant, President of MACAE during 1989, developed the idea and submitted the proposal for the grant.

This third monograph is a state of the art presentation on computer assisted instruction for adult students in Adult Basic Education, in developmental education, and in rehabilitation programs. The articles have been written by practitioners for practitioners. The programs are being provided by the public schools, community colleges, libraries, volunteer agencies, and a rehabilitation facility. Examples are provided from rural, suburban and urban settings. Suggestions are offered as to what software programs have been effective with students (including learning disabled and individuals with physical disabilities and sensory impairments), how cooperative programs between other agencies (such as libraries and rehabilitation agencies) are being implemented, how computer assisted instruction supplements volunteer tutorial programs, and how rural areas with limited funding can use technology.

MACAE would like to acknowledge the cooperation of several individuals and organizations in preparing this monograph. The planning committee of the Adult Literacy and Technology Conference, held in St. Paul, Minnesota July 18-21, elected to produce a monograph describing the experiences of Minnesota adult literacy educators with technology for individuals attending the conference. A generous grant from the Gannett Foundation was provided to cover costs of production and mailing. Drs. Terilyn Turner and Elizabeth Frick provided editorial leadership in working with the authors - Marge Adkisson, John Arenz, Donna R. Berg, Claudia Bredemus, Joan Eisenreich, Bernell Fedje, Eloise Fredrickson, Marge Kaufer, Polly Olson, Linda Strand, and Linda Willette - and members of the MACAE Monograph Editorial Board in producing this overview of the uses of technology in adult literacy programs in Minnesota.

Harlan G. Copeland, President
MACAE

Introduction

Adult Literacy and Technology: A Mosaic Image

Minnesota has a proud educational history and continues to celebrate one of the lowest dropout rates in the nation. Long viewed as a leader in the educational arena, Minnesota faces new challenges posed by changing demographics, shifts from a manufacturing to a service economy, and increased competition for the taxpayer's dollar. Minnesota shares the national dilemma of how to confront the challenge of illiteracy.

The use of technology in addressing societal problems is not new in Minnesota. Minnesota Educational Computing Consortium (MECC) was the first state-funded program in the nation designed to review software for public schools. St. Paul Companies was the first insurance company to bring computers into the insurance industry. Control Data Corporation with its PLATO system, and Cray Research, architect of artificial intelligence, have both accustomed Minnesotans to expect technological solutions to problems. Thus, it is not surprising to find Minnesota taking a leading role in discovering how technology can improve the literacy skills of our nation.

In 1985 the first national invitational conference, titled "Adult Literacy and Computers," and sponsored by the Gannett Foundation, was held in Minnesota. In that same year the Technology for Literacy Center opened its doors, providing direct service, training, research, and incentive grants to St. Paul and greater Minnesota. More recently, the 1990 Adult Literacy and Technology National Conference was held in St. Paul. The publication of this monograph represents a culminating event for the conference and for training that has occurred over a five-year period in Minnesota.

Clearly, events in the area of literacy and developments in new technology have also had an impact on the programs and practices described here. Each program is unique in its geographic location, mission, clients served, and methodologies used to deliver instruction. What is remarkable is the similarity of overall vision, issues raised, and future recommendations of these widely differing literacy projects. Each article adds a new shade or dimension in the application of technology in literacy instruction. Themes appear and reappear: empowerment, access, motivation. By tracing these themes through the articles, patterns emerge in a mosaic image.

One theme is found in the worth of technology for raising the self-esteem of adult learners. Technology is mentioned repeatedly as a motivating force for adults "turned off" by regular classroom instruction. As one author puts it, "computers have turned around more than one reluctant adult learner."

"Access" is mentioned as a significant issue for many programs and takes on multiple levels of meaning. "Access" means adaptive devices for the physically challenged in one program, but for another, "access" means electronic networking. Access to literacy instruction through technology is mentioned in several articles as part of a larger issue: learner empowerment.

All articles project needs for software, technology, and solutions to come. Software that is more than "drill and practice" is a recurring theme. It will be useful for the reader to remember that "context is all" when considering the application of software in other literacy programs. Packages praised highly by one have been rejected by another. The explanation for this diversity is easier to understand and reconcile with the reader's own needs when the wide range of literacy projects is considered. These projects range from a large urban technology center, to a small walk-in library with volunteer tutors, to a vocational training program. It is hoped that readers will identify with at least one of the authors and projects described, finding grounding for their own beliefs and needs, as well as suggestion for technological solutions which will address those needs.

Each article enriches our knowledge of the possible uses to which technology can be put in a literacy program, adding depth and color to the mosaic image. Claudia Bredemus' article describes literacy projects as ending Phase I, poised to begin Phase II. This is a helpful image and suggests that this monograph reflects a particular point in time in the development of both literacy and technology.

By presenting diverse and convergent opinions, a variegated pattern emerges, providing perspective and insight into the use of technology for adult literacy programs. At present, we believe these articles make a contribution to the literature on the topic by providing practitioners' perceptions of specific adult literacy program and software descriptions.

Some pieces seem to be missing. Perhaps they are not yet made, or will be clarified over time. It has not been possible to have full representation from all the diverse literacy providers in Minnesota. Rather, we hoped that this monograph would provide a slice of time and space in Minnesota's development. As such, this work can serve as a guide for other literacy programs pursuing similar goals: how to best use technology in adult literacy instruction.

Terilyn C. Turner
Lifelong Learning

The Computer-Assisted Literacy Center in the Duluth Public Library

Marjorie A. Kaufer
Duluth Public Schools

In the four years that the Computer Assisted Literacy Center (CALC) has been in operation, we have expanded to meet the growing needs of the area's adult population in need of upgraded basic skills. In October 1986, the Duluth Public Library received an LSCA Literacy Grant to establish a CALC at the Main Library. Five Apple computers and workstations were purchased and installed. Software capable of teaching reading, writing, and arithmetic skills for grades one through eight were purchased along with books, magazines, and newspapers for adult new readers.

Students come to CALC via two routes: as literacy students working one-to-one with tutors, and as Area Learning Center students using our materials to enhance classroom studies. CALC's Literacy coordinators work closely with tutors and ABE instructors to design individual programs to meet each student's needs. The Center has a bibliography and checklist for its software collection of 136 programs. Tutors and instructors use the bibliography to choose appropriate software for each student. Each student's checklist is kept in the student's file so that the staff at the Center are able to provide the correct software whenever the student can use a computer.

Inventorying learner needs

When a student with low basic skills comes to CALC for help, we get acquainted through an initial interview. The purpose of the interview is three-fold: to begin establishing a level of comfort and trust, to ascertain the student's needs, and to assess the student's skill level. CALC staff use a modified version of the Roswell-Chall test that focuses on letter/sound recognition, consonant blends, short and long vowel sounds, vowel digraphs, and multisyllabic words. From this test, we are able to determine if phonics instruction is needed as the main thrust of the individualized reading program. A student with poor phonics skills is assigned a tutor who has been trained in the Laubach Way to Read (LWR) method, a phonics-based program. A person who has a working knowledge of phonics is assigned to a tutor who has been trained in the Literacy Volunteers of America (LVA) method, as LVA is a language-experience-based program.

After the initial meeting between tutor and student has taken place, CALC staff contact the tutor to discuss concerns and strategies, and to recommend print and software materials. Monthly contacts are made to both the student and the tutor, providing a continuous link between the student, tutor, and CALC staff.

Helpful phonics programs

Students in need of basic phonics instruction are encouraged to use the computer to practice and enhance skills introduced by their tutor. Developmental Learning Materials has three software programs, **Construct-a-Word, Hint-and-Hunt, and Syllasearch,** which use an ECHO synthesizer to reinforce instruction through speech. Students develop accurate and fluent decoding and word recognition skills: 1. consonants, consonant clusters and phonograms (**Construct-a-Word**); 2. short vowels, vowel digraphs, and diphthongs (**Hint-and-Hunt**); and 3. practice skills need to read multi-syllabic words (**Syllasearch**).

Once students are able to read at a third-grade level, the reading program we suggest is I/CT's **Cloze Plus** program, designed for reading improvement through structured context analysis activities. Comprehension, drawing conclusions, providing definitions, and classifying are the targeted skills for **Cloze Plus**. Until recently, this program covered reading levels grades three through six. Now available through I/CT are levels one, two, seven, and eight and a **Guided Reading** program that looks very promising. The Center has them on order and will begin to use them as soon as they arrive.

Encouraging students to write as soon as possible

In addition to these programs, we encourage our students to write as soon as possible. For students with low literacy skills, this means that their tutor types for them while they dictate. Eventually the student will do both. Not only does writing help the student to learn to read, but it also enables them to learn how to use a word processor. We have found that writing helps students to begin to communicate in a logical and sequential fashion and provides a reason to learn correct spelling, grammar, and punctuation skills. In addition, the word processor allows students to manipulate the text that they write without having to physically rewrite the whole piece, thus making the writing process less tedious.

Helpful word processing programs

We make use of two word processing programs at CALC. For new readers and writers, Hartley's **My Words** is excellent. Commands are in icon form for independent use by the beginning reader. Each student's disk records an alphabetized list of the vocabulary used by the student, enabling instructors to compare the student's word list with established word lists.

My Words employs the ECHO synthesizer to provide students the opportunity to hear the computer read their writing. Listening to the words being read allows the student to hear how their work sounds to other people. The student becomes the editor, making changes until the writing says exactly what the student wants it to say. A positive by-product of this process is that students begin to see themselves as people able to commu-

nicate through writing. The more students perfect their writing, the more they see the need for correct spelling, grammar, and punctuation. The motivation to learn increases as well as the student's self-confidence.

Appleworks is the second word processing program used at the Center. The capabilities of **Appleworks** are more advanced than those of **My Words**. For students whose writing abilities are more advanced and who are interested in learning word processing skills for employment purposes, we recommend this program because it allows for integration of word processing, data base, and spreadsheet functions. Its main use at the center, however, is for writing assignments, resumes, and job applications. When students leave our program, not only do we hope that they are actively reading and writing, but that their new technological skills will give them more confidence in the job market.

A common thread among students in adult literacy centers is that their skill levels range from nonexistent to sophisticated, and their educational goals range from learning the alphabet to entering college. To meet the diverse needs of the students at CALC, we have included software in the following areas: reading, language arts, life skills, math, science, social studies, typing, writing, and word processing. Because many of the students we serve are not able to learn by traditional teaching methods, we have tried to vary the strategies used in the software programs we choose. Programs using a drill-and-practice format are interchanged with those using a game format, increasing motivation while providing necessary practice.

Overcoming logistical barriers

CALC is dedicated to providing computer-assisted instruction to students in need of upgrading basic skills in the Duluth area, and we have struggled to overcome barriers, the largest of which has been logistical: How do we bring the students and the software together? The Center has tried different ways to overcome this obstacle. CALC made an agreement with the Duluth Transit Authority to buy tokens at a reduced rate, which are given to learners who need them. Learners are asked to pay whatever they feel they can afford, if anything. CALC staff have also investigated renting buses to transport literacy students, but found the cost to be prohibitive. We are currently looking into contracting with a local taxi company on a 48-week basis to transport eight students three to five times a week to the Center.

Licensing: a technological Catch-22

An alternative strategy involves bringing the software to the students. In 1989, the Center received a grant enabling us to purchase telecommunications equipment to link CALC with remote literacy sites. The idea was to be able to send the software housed at CALC via modems over telephone lines to other ALC classrooms. The program was titled Adult Education

Software Outreach Program (AESOP). However, when CALC applied for the grant, no one foresaw the copyright problems involved in setting up a network system which included sites located in other buildings.

Copyright laws for computer software have been open to interpretation by both those who hold the copyrights and those who purchase the software. The first problem encountered was extreme reluctance on the part of the software companies to sell software to CALC which could be used off-site via modems. The definition of the word "site" is the obstacle to overcome. While, for example, an elementary school may purchase one piece of software and have a "site license" to utilize that software in each and every classroom, ABE classrooms are not viewed by software companies as being "on site" because they are not housed under one roof. In addition, the concept of sending software through phone lines via a modem, even though no permanent copies would be made and one person at a time would be using the software, was interpreted by most software companies contacted by CALC as a violation of copyright law.

Humanities Software was the first software company which made an agreement with CALC to allow software to be utilized for AESOP. This agreement was reached by CALC agreeing to pay a higher price for software than could be used for AESOP. I/CT has agreed to let CALC use its **Cloze Plus** and **Guided Reading** program for AESOP at no additional cost. We hope that CALC can come to agreement with other software companies so that software purchased for use by ALC students can be used by all ALC students regardless of the physical location of their classrooms.

We at CALC believe that the use of computer technology is an extremely valuable method to improve basic skills, self-esteem, and the employability of adult learners. Computer-assisted literacy instruction erases the social stigma of "going to a reading lesson" and replaces it with the high status that society awards the computer-literate. The computer is flexible, patient, and impartial in dealing with adult learners. Students coming to CALC practice at their own pace while on the computer, and are able to receive individualized assistance from CALC staff and volunteers. Our immediate goal is to utilize the resources that we have at the Library better through greater efforts at publicity, transportation, and telecommunications. We want as many people as possible to benefit from the resources at CALC.

Helping College-Level Learning Disabled Learners Through Computer-Assisted Instruction

Eloise Frederickson
Minneapolis Community College

It happened again, as it does every quarter.

This time it occurred after a study skills class. During the hour, the class had taken an informal inventory that indicated each learner's preferred mode of learning. We talked about the advantages or disadvantages of some of the modes. For example, those who discovered that they learn best kinesthetically (through touch and feel) would have to find ways to adapt to situations where most of the learning takes place through print. Those who learn best through print would have some difficulty if they happened to get into a class in which most information was presented aurally by way of lectures.

For most of the learners in the class, the fact that people learn in different ways was a revelation. It gave them insight into the cause of some of their past failures, but it also made them aware that they might have to make more adjustments in college than they had thought.

It was after this discussion that Megan approached my desk.

"I don't know if you will understand this," she said, "but reading has never made any sense to me. I try and try to do all the reading I'm told to do, but I just don't get it. I don't understand what it's trying to tell me." The frustration she was feeling was evident in her face. She looked around to see who could overhear. She was near tears as she went on to explain her situation.

"I started college in Wisconsin last fall, and now, because I've failed so many classes, I'm on probation. If I don't make it next quarter, I'm out. That's why I'm here. I thought that this "How to Study" class could help me get more out of my textbooks." The rest of the learners had left, so we had the room to ourselves. I listened carefully as she talked.

"I don't think that I'm dumb. I can do lots of things very well. Math, for example, is no problem for me, unless I have to do word problems. I'm also a pretty good writer. I may have trouble with spelling and punctuation, but I think that I have some interesting things to say, and I take some unusual approaches to the subjects I write about. I'd like to be a journalist, but my assessment scores are low in both reading and writing. That is what has me so confused - this big gap between what I know I can do and the grades I get in my classes. Why do I have so much trouble?"

Detecting LD characteristics in adult learners

Though I'm not an expert in learning disabilities, I've learned to recognize certain signs. Comments such as these prompt me to pursue a line of gentle questioning. "Were you ever in any special classes in high school? Is it difficult for you to take notes during lectures? Do you have trouble distinguishing important information from unimportant information? Does it take you a very long time to finish a reading assignment?" As I go through this procedure, I am aware of the fact that the learner has grown to trust me enough to divulge information that each has kept hidden for years. I know that support and encouragement are needed almost as much as some concrete, practical advice.

Megan is one of many learners who discover their learning disabilities when they get to college. They knew that something wasn't right when they were in high school, but somehow they got by without too much difficulty. They could talk to classmates about the reading assignments or get all the necessary information from classroom discussions, but in college there is no way to get by without doing the reading. Instructors for some classes test on textbook information while mentioning it only slightly in class. Often class time is used to present supplemental information or further examples of case studies or experiments. The textbook provides the core body of knowledge for the class.

Unfortunately, learners like Megan often find little support or understanding of their problems at colleges. Many instructors mistake the inability to take notes during lectures for pure laziness and the request for extra time to write a test for some sort of shrewd maneuver. The learner, of course, ends up with poor or failing grades and a battered sense of self-esteem from which they may never recover.

Program help for LD learners

If Megan were returning to a community college, however, I could refer her to an extensive system of support and advocacy for such learners through the Office for Learners with Disabilities. A significant part of the program involves the use of computers for instruction as well as word processing. This type of program opens opportunities for learning disabled (LD) learners that were never available before.

The campus has two computer labs, one for those enrolled in computer science courses and doing general computer work and another for computer-assisted instruction (CAI) - drill, practice, and instruction by way of computer programs. The CAI lab is located within the Learning Assistance Center and is staffed by a faculty coordinator, a part-time technician, and peer tutors. Learners who are officially designated LD are encouraged to enroll in a Special Services course held in this lab that will teach them how to use the computer for word processing. In the past, learners learned

the process on Apples using the **Bank Street Writer** program, but now they use **Word Perfect** on IBM compatible computers because of the features of the program and the ease with which it operates.

Word processing and the LD learner

Word processing is very useful to the LD learner. Anyone who uses the computer to produce compositions appreciates the ability to edit and move text with the touch of a few keys. Word processing is an even greater boon to learners who have more than the usual amount of difficulty seeing proper organization and flow. Learners for whom handwriting is a particular problem can produce neat, clean copy with a computer printer and add attractive formatting with very little effort. If spelling is a problem area, the learner can isolate the misspelled word and in most cases suggest correct spelling as well. Another touch brings forth a comprehensive thesaurus complete with definitions, making word choice less of an obstacle.

Other helpful courseware

A most useful program for LD learners is a grammar checker, such as **Grammatik** by Reference Software. This program, available for both IBM and Macintosh, can spot grammatical errors such as split infinitives and subject/verb agreement and provide advice for improvement. It catches mistakes in capitalization, punctuation, homonyms, and commonly confused words. It analyzes learners' writing style, flagging errors in passive voice, incomplete sentences, wordiness, and tone. In addition to all this, the program provides the learner with readability scores and comparison statistics. The program is a lifesaver for LD learners in composition classes. It is also a teaching tool by itself and an excellent way to learn the conventions of written English.

For learners with reading difficulties, **Speed Reader II** by Davidson and Associates, available for Apple, Macintosh, and IBM, has proven to be a popular and effective program. Learners beginning the program first read an article at their own pace and note their reading rate. The "Eye Movement" and "Paced Reading" exercises train learners to move their eyes rhythmically from one group of words to another in much the same way as tachistoscopes do. Two activities, "Warm-up Letters" and "Warm-up Words," focus on sharpening visual perception and broadening peripheral vision. Learners record their scores so that they can later view their progress as they work to increase reading rate and eliminate poor eye habits with the program. In addition, the learners enjoy reading the text of the exercises because it provides them with valuable information about the process of reading.

Since many LD learners have significant trouble with spelling, the lab has several programs that deal with spelling rules and troublesome words. The program most popular with the learners is **Spell-It** by Davidson and

Associates, which presents over a thousand words ranging in difficulty from fourth grade to high school completion. The program requires the learners to work with the words in each lesson several times before asking them to select the correctly spelled word in an arcade-style game where time and accuracy determine the score. The new IBM version of the program has a speech component that pronounces the spelling word if the computer has a speech synthesizer.

Another Davidson program, **Word Attack Plus**, available for Apple, Macintosh, and IBM, helps learners develop a broader vocabulary and ranges in difficulty from fourth grade to twelfth. It, too, presents the words in each lesson in several different activities. First the word is displayed with its definition and used in a sentence. In the Macintosh version, a simulated voice does a fairly good job of pronouncing the word as well. The words appear in a multiple choice format, a usage exercise in which the learners type in the correctly spelled words, and then in a matching game. Finally, an arcade-style game demands quick recognition between the words and their definitions. Learners must not only know the meaning of the words but also their correct spellings. The program has the capacity to print out flash cards and a test for each of the thirty lessons.

Several additional data disks are available with the IBM and Apple versions of **Word Attack Plus**, giving it a great deal of versatility. LD learners especially like to work with roots and prefixes. Over one hundred of the most common roots and prefixes presented in the same format as the vocabulary words.

Smart Words, by Addison Wesley for Macintosh and IBM, is a vocabulary development program at a much more challenging level. Ten words of college-level difficulty are presented in each lesson in flash-card fashion. Learners learn the definition, phonetic pronunciation, context, synonym, and antonym for each of the words before moving on to quizzes. The final activity, a game in the form of a maze, is a rigorous and totally absorbing exercise of the mind.

Reading comprehension is the focus of software such as **Comprehension Connection** by Milliken for Apple computers. Levels G, H, and I (8th - 10th grade level) each contain twenty reading selections that are about two hundred words in length. If learners find the reading selection too difficult, they has the option of reading it in an easier-to-read version before going on to the comprehension questions. The program also features a dictionary for certain words in the selections. Learners must get four of the five comprehension questions correct before going on to the next selection.

Two programs that are especially beneficial to college-level learners, LD or not, are **Tips for College Test-Taking** and **Textbook Marking Strategies**, developed by Larry Mikulecky and Susan McIntyre Adams at The Learning Skills Center of Indiana University in Bloomington, Indiana. These two programs, and several others that they have developed, are so low cost that every CAI lab with IBM-compatible computers should have a copy. **Tips for College Test-Taking** discusses and models procedures to follow both before and after taking a test and gives strategies for answering multiple-choice, true-false, matching, and essay test questions. Textbook Marking Strategies models how to mark a psychology chapter, gives the reasons for marking a textbook and shows the symbols to use, and demonstrates the Survey-Explore-Review process. Learners have the opportunity to practice marking a print copy of a reading selection that comes with the software. LD learners particularly appreciate the programs because they can proceed at their own rate and go over them several times if necessary.

At Minneapolis Community College, LD learners are encouraged to use the computer lab for both the word processing and CAI as often as they want. This effort alone will not eliminate their problems, but, when combined with thoughtful counseling, effective advocacy, and conscientious instruction, it can make college success more certain.

Computer-Assisted Instruction as a Motivational Tool for Adult Learners and Management Tool for Instructors

Joan Eisenreich
Mankato Public Schools

Computer-assisted instruction can provide a motivational tool for adult learners while serving as a management tool for instructors. Our recent experience at Mankato State University illustrates the power and versatility of a well-designed computer lab for working with adult learners in basic education. This case study describes success after only one year of use.

In September 1989, the Mankato Adult Basic Education Program (ABE) installed an IBM computer lab and 1/4 of a Principal of Alphabet Learning System (PALS) lab. [A full PALS lab includes four workstations; a 1/4 lab uses only one workstation.] The IBM lab runs on a Novelle network on IBM computers and a local area networ (LAN) classroom management system. The lab, which is used solely by ABE instructors and learners, consists of nine IBM PS-25 computers, three printers, a Model 60 file server, and a PS-30 Info Window with Touch Screen.

The network system provides many benefits to learners and administrators

After training instructors and setting up a schedule and plan for use of the lab, the ABE program opened and learners began working in the lab in November, 1989. The lab is a diskless environment, so learners only need turn on the computer, enter their names, and choose from the programs shown to them on the screen to begin working. The simplicity of the network prevents damage to or loss of disks, allows many learners to work on the same program at one time and helps learners overcome computer fears quickly, making learners more willing to spend time in the lab.

The network system is also an excellent management tool. The names of the learners are entered into the system in class files that provide the learners access to software appropriate for their skill level. The instructor can monitor a learner's progress to offer positive feedback and adjust the learner's materials to provide a greater or lesser challenge depending upon the individual's needs. This insures that the learner has access to programs related to the individual's classroom materials and at a level of difficulty that is challenging but still feasible. The system provides positive motivation by allowing relatively consistent learner success. The program also maintains records of learner time-on-task and performance. The instructor is able to access this information to monitor learner progress and update learners' prescriptions so that they move on to programs with higher skill levels.

CAI can improve learner attendance and motivation

At the end of the 1989-90 program year, an evaluation was been made of the effect of the lab on the Mankato Adult Basic Education program. We found a marked increase in ABE learner motivation and retention. The most profound effect was noted in the number of learner attendance hours logged. The records showed an increase from 10,613 learner attendance hours in 1988-89 to 22,122 in 1989-90. We attribute this increase in large part to our computer lab. We feel that the use of computer-assisted instruction, even on a small scale, can be an effective motivator for learner participation and retention in ABE programs.

When working with adults referred from both Human Services and Employment and Training programs, the appeal of computer-assisted instruction as a motivating factor has been particularly important. These adults have typically been required to attend a minimum number of hours of ABE class to qualify for assistance payments. Attendance is relatively regular, but when in class they display little motivation to apply themselves to learning. With the use of computer-assisted instruction, we are finding an increase in motivation and enthusiasm about learning and attending class. Instant answers and immediate reinforcement from the computer give learners constant "pats on the back." For a population whose educational experience has often been discouraging, this positive reinforcement stimulates learning and helps dispel some of their negative attitudes toward education. The fact that many learners include computers in their long-range goals for further education is another indication of the benefits of exposure to this technology.

Agency-program cooperation can increase the availability of technology

In cooperation with the Blue Earth County Employment and Training Office, we have recently purchased a **Basic Skills Curriculum** from Computer Systems Research Inc.(CSR). This is a comprehensive basic skills package covering writing, reading, and math from elementary to high school skill levels. Increased cooperation with the county Employment and Training Office may result in the purchase of computer programs that focus directly on employment skills. In addition to the CSR program, we are currently using **Intensive Phonics**, **Primary Editor Plus**, **Touch Typing**, and the **PALS** program.

The **PALS** program is designed to serve those whose reading level is below 5th grade. Our current 1/4 lab can serve only four people at a time. We have found that the 1/4 **PALS** lab was not cost-effective for our program because we serve too few learners per instructor in one **PALS** section. In the future, we will be adding another 1/4 **PALS** lab to make the ratio a more efficient eight learners to one instructor.

Technology can be an effective marketing tool

Arrangements are being made to provide access to the school district computers used by the K-12 program in our other ABE teaching sites in New Ulm and Mapleton. Because the lab has proven to be such a valuable motivator, we plan to use the availability of the computers as a marketing tool in the recruitment of learners in our ABE Consortium. Publicity for ABE programs will include computer use education and open computer lab times as part of Basic Skills Education. This open-lab time increases learner access and provides a way for them to progress more rapidly toward their goal. It also gives learners an option to tell others they are going to "computer class" rather than basic skills classes. We believe this helps some learners feel better about themselves and provides a more socially acceptable reason for attending classes.

Technology must be managed well to be effective

I have indicated that the computers have been a strong motivator and have been successful in learner retention in our program. However, just having the computers available does not necessarily mean learners will use them to their best advantage or that they will be motivated to continue in the program. There is a potential for learners to "play" with the computer and when the novelty of learning how to use the computer and the "play" becomes routine or boring, learners will likely drop out or return to just "putting in their time."

We have found the following to be important factors in the success of computer-assisted instruction for motivating and retaining learners:

1. An aide or instructor should be available to assistwhenever learners are working on a computer to provide immediate answers to questions or help getting through a small technical problem. This reduces learner frustration and insures a more positive experience and greater success.

2. Learners should be expected to work with text books and spend some time in the classroom with an instructor or in independent study as well.

3. First: Introduce information in a classroom situation with text materials, and Second: use the computer to reinforce the knowledge learned in the classroom—rather than the other way around.

Computers should not be used to replace an instructor but to reinforce knowledge learned through texts and classroom instruction. Therefore, software should be purchased with a program's core curriculum materials in mind. Use of computer software is more effective if the information presented is related to the drills and information in print-based materials being used. The learner should be familiar with the information, vocabulary, principles or concepts being introduced by that level software before beginning. The software needs to be challenging and should require the

learner to engage in critical thinking. However, if the math software asks the learner to determine the square root of a number and the learner has never heard of a square root it can be very frustrating and discouraging.

Criteria for software selection

Before purchasing software, it should be pre-tested by learners and staff to determine (a) clarity of instructions, (b) ease of use, (c) appropriateness of presentation (adult-oriented vs. youth-oriented), (d) creativeness of presentation, and (e) quality of wrong-answer feedback. Feedback should be given for all answers and in a positive way. When wrong answers are given, the program should explain why the answer given is wrong and why the right answer is right.

Certainly, ABE programs can and do function successfully without the use of computers, and there are many people who live and work successfully without knowledge of computers. However, there is a recognition among most ABE learners that improving their education is essential to their success in the job market. Many also recognize that knowledge of computers is becoming an important factor in obtaining or retaining employment. By providing ABE learners with the opportunity to gain knowledge of computers we can provide the incentive to participate in ABE programs, and the motivation to improve their education. This may be the edge they need to be successful in a job or in pursuit of higher education.

The Metro North Reading Lab: Enhancing Non-Traditional Adult Learning

Bernell Fedje
Anoka/Hennepin School District

In September, 1988, Metro North ABE opened a Reading Lab at its Anoka County Learning Center in Spring Lake Park. The lab was designed for adults who read, write or spell below the sixth-grade level, a category of learner which has had only one previous option: one-on-one Laubach tutoring by trained volunteers. Metro North planners had three objectives in mind in designing the lab to compensate for some of the limitations of volunteer tutoring or of higher-level ABE classes:

1. Develop a setting, instructional techniques and staff to counteract the embarrassment, fear, and pain that the lowest level learners often feel when coming for literacy help. We have had experience with the lowest-level clients not wanting to reveal their need to any more than one or two program people.

2. Provide a class schedule intensive enough to encourage high learning retention and high awareness of progress. The low intensity of volunteer tutoring often leaves learners discouraged by their slow progress.

3. Provide a vehicle for low-skilled adults on General Assistance to make the necessary skill improvements to become self supporting. We were confronted not only by slow learner progress, even when a learner was working with skilled volunteers, but also by State regulations requiring a minimum of six hours of instruction per week.

Getting Started

To allow emotional comfort and safety when the client first enters, the reading specialist does an individual intake comprised of an oral assessment of sight word recognition and decoding, a brief comprehension check and an informal discussion to elicit learner goals and interests. The initial testing is minimal in order to avoid dredging up bad memories of past failures. The reading specialist then describes the Reading Lab and demonstrates the varieties of materials and methods of learning. Learners who now have an estimate of their skills and an awareness of what our program is like can determine if they can be comfortable working in the Reading Lab or if they need strictly private tutoring. Given their choice to stick with the lab, the learner and the reading specialist cooperatively begin work on a learning plan.

Each month, the instructors set aside a block of time for all learners in the program to review their goals and to set new monthly goals. With encouragement, most learners become comfortable enough to share their dreams with other learners and with volunteers, and thus allow the class to become a support system for them.

Generally, one instructor and one volunteer work with five to nine learners, and most learners come to the two-and-one-half-hour class all three days per week that it is offered. The learners are encouraged to become independent learners who actively participate in the learning process.

Popular software options

The instructors make a wide variety of learning tools and methods available in order to keep the interest up and to meet the equally wide variety of learner needs. Computers, video tapes, manipulatives, peer teaching, small group work, and individual work with the instructor or the volunteer are all used according to individual need and effectiveness.

A beginning reader will typically use a computer program such as **Discover Intensive Phonics** (HEC), work individually with a volunteer reviewing what the learner learned and then individually work on correlated print material. The learner may choose to work the lesson several times on the computer before consulting with the volunteer or may also request other materials to help learn the skill. Some beginners like to develop sight words by using a video format such as **TV Tutor** (New Readers Press). Reinforcement may come by working with the reading specialist or the volunteer and by writing the words on acetate sheets with markers, by writing in sand trays or on blackboards, or by making words with clay letters. They may dictate language experience stories and then write them out on the word processor or have the volunteer type them out. Beginning readers are often paired with more advanced readers in visual problem-solving computer programs such as **The Factory** (Sunburst).

Learners reading at a second or third-grade level have more materials to choose from. The **Challenger** series (New Readers Press), with the lesson words on audio tape is very popular with our adult learners. The **Core** reading software (Educational Activities) has given structure that some learners ask for while using the computer.

Learners in the fourth- to fifth-grade range can work quite independently. Some choose to review phonics with **Discover Intensive Phonics** (HEC), but most need work in comprehension. **Developing Reading Power** (Mindscape) and **Comprehension Connection** (Milliken) are the most popular with our learners to develop those skills. The learners are most successful when they follow up by discussing their readings with the reading specialist or volunteer. Word processing is very empowering to

learners at this level. They type letters, copy favorite poems and recipes and study spelling words on the word processor. Although we have not been teaching keyboarding in our lab, learners have access to several programs to help them with keyboarding difficulties.

The **Carmen San Diego** series (Broderbund) has been popular for group work. The reading specialist introduces the program and keys in the initial answers so the group can focus on the meaning of the content. Gradually, learners emerge who are ready to take on the program by themselves. Such game format software is an energizing change of pace and is good for building group relationships.

Across all reading levels, learners like to use **Print Shop** (Broderbund). They make greeting cards for family members or each other and help decorate the classroom with banners and posters. They have also made flyers advertising their skills for part time work. They like creating a visual product which impresses their families. This type of exercise is valuable in their learning progress because it encourages them to follow directions, fosters peer teaching, and affirms the concept of a computer as a tool, not an "electronic workbook."

Factors for program success

It has not taken long to observe that the confidence and independence that an adult feels when using a "user-friendly" software program carries over into tackling the many skills needed to become a better reader. The opposite is also true; no matter how valuable the content, a difficult program is counter-productive to our goals. Therefore, the instructors preview all software in the classroom with the learners and observe reactions and ask opinions. When we receive new software, learners work in pairs or triads to become familiar with it.

Learners express appreciation for computers because they are non-judgmental, "patient," and, for the most part, fun to work on. They can help learners review and reinforce skills previously taught, as well as build new vocabulary, increase comprehension and develop problem-solving skills. Our clients often comment on how delighted they are with themselves for "mastering" the computer, and they delight in teaching new learners how to use the computers and the software.

Computers, with appropriate programs, have proven vital for learners with learning disabilities and physical handicaps, and even the lowest level reader in class can be successful in learning. Fleischman's **Basic Word** (Hacienda La Puente) on the Macintosh, with its voice capability, has been helpful for low-level readers who need to hear and see the word at the same time. Learners who have physical limitations from cerebral palsy or strokes find computers absolutely liberating. Although they may not be

able to hold a book or a pen, they can still work on phonics, vocabulary, or comprehension and can use word processing for putting their thoughts into essays, notes or letters.

In designing the Reading lab, we worried about serving the broad range of readers from beginning to 5th grade skills. We were also concerned that these target clients might not be willing to work in a classroom at all. In the two years of the lab's existence, we have seen how hesitant many adults are when coming into a class. But in the setting we created, we have seen other class participants confidently work to put newcomers at ease and help them to adjust. We have also seen the benefit of giving learners choices in their learning. When a knowledgeable reading specialist helps other adults know the resources, know themselves and calculate the most useful choices and sequences, adults grow into productive, interdependent learners.

So, the Reading Lab has succeeded in all that we asked of it at the outset. The response has been large enough to fill four classes, mornings, afternoons and evenings, three days per week. Two reading specialists and more than twenty volunteers are needed to keep the lab operating. Most importantly, it has been a "safe" setting for fearful people, and the eclectic, multi-method approach to learning, highlighted by technology, has encouraged learners with low or conflicting motivation to study regularly and often. Such regular and intense learning has led to success for many clients who have long been chained to the welfare system or have suffered shame because of poor skills. But such intensity leading to success is enhanced considerably by attractive, effective technology. As one learner has said, "I like working on the computer because I can take as much time as I want. I never knew I could learn so much using the computer. I thought it was just for kids!"

The Use of Technology in Rural Minnesota ABE Programs

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Most Adult Basic Education (ABE) programs in rural Minnesota use technology as part of their classroom instruction. Instructional technology can successfully enhance basic skills learning. However, the use of computers and other technology does not mean magic will take place. The challenge is to purchase wisely and to incorporate technology into the curriculum without forcing either student or instructor into a challenge for which they are not ready. We must keep these principles in mind as we incorporate technology into our curriculum and reinforce it in student individual education plans.

There are two important reasons to use the computer with ABE students. It is an excellent academic tool, and it acquaints students with the electronic world in which they will acquire a job. Using technology for adult learners with deficient learning skills will help give them access to knowledge which much of the working world takes for granted. Many adults who have poor learning skills do not want to reveal their weaknesses to an instructor, but they are willing to use the computer because this is a prestigious experience. The computer thus becomes a learning tutor and also a self-esteem builder.

Applications for adult programs

The microcomputer revolution has created a richness of new learning dimensions. Each year, our rural programs become more involved with technology as a part of our total learning experience for adult learners. It is important that our relatively small rural projects learn from other "richer" projects which have been innovative. Many developers will adapt their programs after some use so it will be more useful and economical to the next group of purchasers, and we must all communicate our responses to programs to the companies that publish them.

An adult educational learning site does not need each new program just because it sounds new and exciting. A few programs used wisely will give adult learners experience in technology, plus help monitor their academic learning program.

Some of the programs which we use without expending a large sum of money include an integrated word processor, a data base, a spreadsheet program, a basic skills tutorial program, a teaching utility program, a personal development program, and several smaller programs which are channeled to the students in their special learning packages.

Popular programs

Basic Skills Series software is a commercial program which is available for the Apple II series, IBM PC and compatible and Commodore 64/128 microcomputers. The program has an evaluator disk, test disk, and disks to remediate reading, writing, and mathematics using a comprehensive, self-contained software program.

"The Evaluator" estimates student's proficiency in reading, writing, and mathematics and familiarizes the student with computer testing.

"The Tests" randomly select questions for each objective in each grade level of the three subject areas and offer teachers cumulative and objective-specific test results.

"The Exercises" provide individual tutoring, including clues after each incorrect response; the teacher is able to select objectives in which students need remediation. Black line masters which can be duplicated provide organized methods of recording students' scores and class profiles.

AppleWorks is an integrated program which empowers both the student and the instructor and is limited only by their imagination. It can be used as a word processor by the student for business-type correspondence, creative writing, and simple desktop publishing. The Data base can be used as a tool for students to use in organizing any data which is important to them. The spreadsheet part of the program can be used by students to expand their mathematics skills. It is also an invaluable management tool for all of the records, correspondence, and publications which are an important part of any ABE project.

MECC: Many school districts have a contract with the Minnesota Education Computer Consortium. This is a good source of programs for our adults. Each school district that is a member of MECC has a catalog with program suggestions and assessment of suitability for adults. Many of the MECC programs can be previewed through school districts.

Master Spell is an authoring program that will let you generate lists of words for each individual student's spelling skills or needs. All levels of words can be individualized for the student.

Study Guide is a teaching utility program that a teacher can use to create individualized learning questions and feedback. The questions can be multiple-choice, true/false, fill-in-the-blank, or matching. The questions can be used either as a computer-tutor experience or as hard copy.

Typing Tutor is just one of many typing tutors to help the student become more familiar with the computer keyboard.

Please Understand Me is a personal development program based on the Myers Briggs Test. The student answers forty questions and the computer will provide feedback about their personality type and some of the reasons they function as they do.

In addition to the publishers' programs listed above, public domain software provides an inexpensive source for small niches of skills in any program, usually for the cost of a disk. One of the public domain programs we use is an **Electric Flash Card** program. This program is for students who are having trouble with any of their four basic arithmetic skills; they can practice individually to help improve these skills. It can be a time-consuming job to preview these programs looking for just the right teaching skill. Therefore, this source may not be as economical as it seems unless you can incorporate some volunteer help.

Planned/Future Prospects and Trends

Family literacy is a popular term today. The Minneapolis Star Tribune said recently: "Almost nobody these days denies that the nation's children are in trouble: poverty, neglect, abuse, failure in school, chemical addiction, run-ins with the law, even premature death. But the experts can't agree on what to do" (Smith). One of the best things that an ABE project can do for a troubled child in a poverty situation is to educate their parents so they can gain confidence in making life decisions, learn basic educational skills, and obtain a better-paying job. Technology gives us a variety of methods to educate the individual. Lester Brown of World Watch states in the State of the World 1990: "Literacy is the basis for solving poverty."

Our ABE program in Pipestone, Minnesota plans to continue to watch the technology market and take advantage of every possibility to incorporate technology into our program. We hope to be able to narrow the generation gap between parents and children by sharing with the adult the same technology used by their children are using in school.

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The City Mouse and the Country Mouse

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Ask an old farm hand about using computers and he'll often snarl, "Ah, computers are for kids— I'm too old to learn much. It's mostly games anyway and I really don't need that stuff." But be patient, take it slow and show him what it can do for him. A computer in an ABE class can be more than a challenge...it's fun, reinforcing, always there, forever changing, adding new things, building self-confidence.

Clem was afraid of "that new-fangled contraption beeping at everyone" (Henry Ford and the Wright brothers were laughed at too). He said he "would just as soon blow that darn thing up" (a computer error had taken away his welfare check). Never mind all the good things computers did in everyday life from VCRs to cars. Computers were the enemy, something to be feared, never to be conquered. "Too many blasted things for it to get going! I can't remember it all 'cuz I'm too dumb."

Less than two weeks later, Clem's gnarled old fingers used the hunt-and-peck system to produce his "masterpiece" of poetry. With spellcheckers and grammar consultants, he did not worry about mistakes. The beauty of the poems filtered through and the final printout on a laser printer was quite professional. He was proud!

Clem mastered the alphabet while learning the keyboard; he finally caught on to **Intensive Phonics**. Some of the games helped his math skills improve. He came early, stayed late and never missed a class. Now he boasts he beats his grandkids at **Computer Monopoly**!

Apple Classrooms of Tomorrow

The Blue Earth school is one of three Apple Classrooms of Tomorrow and our elementary students are well-educated in computers and other technology. Our challenge is in re-educating our older generations (parents and grandparents) in the technology that is here today. More than 2/3 of our 20,000 population of the 400-square-mile county in southern Minnesota is rural (farms or villages under 500 people). Almost 50% of the county residents are over age 50 (1990 estimate).

The perception that technology is *needed* only in big cities, big corporations and big budgets is fading in rural areas. Modern farming requires technology in many forms including computers. Schools faced with declining enrollments have opted for technology for classes beamed in for language, science and other special interests.

In job training in rural areas, learning how to use a computer is crucial. Some computer experience may make a real difference in getting the job. Part of my "Job Seeking Skills" class includes an introduction to computers and word processing. Several learners wanted to come in for more lessons.

Computers have turned around more than one reluctant adult learner. It's a change from workbooks, rote memory and even dunce caps of the old country schools. It's a chance to command a clever machine which is capable of doing great things. In control of the computer, the learner has a final product that is perfect without a lot of recopying.

Sharing computer expenses and benefits is essential

Shared expenses can really help rural communities. Isolation is reduced with the instant communication of computers, modems and faxes. The costs of personal computers and business units are under $1500 and therefore are more accessible to families and small companies. Because of these factors, Adult Basic Education and Community Education classes need to prepare lifelong learners for the 21st century now through offering access to and classes in computer training.

Adult literacy learners have started to use school computers at night and even during the school day when possible. Adults are the taxpayers who support the school and should have access to life-long education, including technology. This is another reason why computers need to be in public libraries for public access.

Our Library and Literacy partnership is working on open computer use for our Laubach learners and regular library patrons. As libraries move to computer card catalogs and microfiche readers, users must become more comfortable with technology. With libraries renting VCRs and tapes, perhaps it won't be long before computers and the software will be loaned through small libraries like ours.

With adult literacy learners, the word processor helps produce the language experience stories for learning. The best stories are selected by the tutors for a computer-printed booklet. **Printshop** software makes birthday cards and posters for special events. Even physically and mentally handicapped adults can succeed with **Printshop** software.

Technology: A great equalizer

Computers are great equalizers. More than one chuckle has been heard when "teacher" makes a mistake and the computer beeps! or when the computer locks up and all else fails, read the directions in the "user-friendly manual"! Teachers and tutors are first of all human beings; most of us had to learn about technology a little bit at a time and have survived. Adult learners need to realize we were all beginners at one time.

MECC software for K12 and other commercial programs can be adapted for adult use. Even a 47-year-old feels like a kid sometimes and enjoys the "free" games and reviews fundamentals again. Some adults never had the opportunities to learn at their own pace; in an ABE class, they are in control of their learning. Self-selecting software builds in success for them. What looks juvenile to a teacher may be just "fun" for a learner. The old adage: "If it works, use it," should be the guide. When adults are in charge of the goal-setting process, computers are just another tool.

The difference between a city mouse and a country mouse will diminish as more rural schools, libraries and businesses accept the computer revolution in education. Technology has power.

Important Considerations in Educational Technology For Physically and Sensory-Deprived Adults

Linda Strand
Robbinsdale Public Schools

Courage Center, a rehabilitation facility for individuals with physical disabilities and sensory impairments, is located within the Robbinsdale Area School District. Believing that opportunities should be the same for all adults, the ABE program at Robbinsdale developed collaborative services with Courage Center beginning in 1978. The Robbinsdale/ Courage Center Adult Academic Program is a part of the Adult Basic Education delivery system in the state of Minnesota.

Included within Courage Center is a residence for 64 adults who come for an average of nine to fourteen months. While living in the residence, adults strive to achieve maximum independence and personal responsibility through a variety of therapies and programs. Approximately 80% of the adult learners in the academic program at Courage Center are residents. The other participants live in the northwest suburban area.

Computer literacy as a basic skill

Residents can select programs in which to enroll; one option is the Adult Academic Program. Adult learners in the Academic Program are seen for forty-five minutes, one to four times weekly, in a one-on-one tutoring setting.

Computer-assisted instruction (CAI) is the choice of the adult learner at Courage Center; therefore; the program uses computer software as the main source of lessons, and textbooks as supplementary materials. Sequences which include software and textbooks have been established in all academic areas. Adult learners can sign up for additional time for independent study depending on computer availability. Software management systems help track learner progress when computer-assisted instruction is used for independent study.

In this age of technology, and especially for adults with physical disabilities, computer literacy has become a basic skill. Our computer literacy curriculum includes basic information on how to operate a computer, the parts of a computer, and an overview of what a computer can do for the adult and word processing. Additional application programs for IBM, MacIntosh, and Apple computers taught by volunteers include data base, spread sheet, money management, and occasionally basic programming.

Advantages of computer-assisted instruction

The greatest advantage of CAI for adult learners with physical disabilities is that it allows the adult learner to be independent. Many are not able to use their hands to write with a pencil, but they can access a keyboard.

CAI assures privacy. No one else knows for sure what the adult learner is doing. Everyone can identify the cover of a book, but they can't determine the level of learning by what is on the computer screen.

CAI provides immediate, positive feedback. The adult learner continues until the right answer is chosen. Furthermore, the teacher does not gasp or show disapproval in some way. It is an invaluable tool for adults who have had head injuries. One of the most common problems that is encountered after a head injury is impulsiveness. The computer does not allow an adult learner to be impulsive. It is wonderful retraining. No one has to say anything; the adult learns to slow down.

Educational software provides variety and documentation. Each software program uses a different approach and more modalities are included when using CAI than when using most text-based curricula. For example, a beginning reading program allows the adult learner to hear it, say it, see it, and write it. Our adult learners often find books overwhelming, but with computer software they will do a lesson and feel a sense of completion even if the next lesson is on the same disk. Progress is demonstrated visually to the adult learner through software management.

Computers provide a new way to learn. One adult learner said to me, "You can teach me anything you want, but make sure it's on a computer!" If books, paper, and pencil haven't worked the first time around, chances are they will not work much better now.

CAI provides a relationship to vocational plans. Adult learners believe that they are learning a skill that will relate to a job. They are on the cutting edge. In many cases they are using something that their children are using in school.

Adaptive Devices

An adaptive device is equipment that allows a person easier access to a computer. Because adaptive devices are expensive, our goal is to be able to use the computer without these devices whenever possible. Adaptive devices may include

Table Height: Be sure that a wheel chair can fit under the table. Computer users should not have to raise their arms in order to reach the keyboard. Sometimes it is necessary to have the keyboard on a lower table or on a lap tray. Computers with movable keyboards are much easier to access than those with attached keyboards. The MacIntosh , IBM, and Apple IIGS all have movable keyboards.

Splint or Universal Cuff: Many of our adult learners wear a cuff that allows a pencil to be inserted so that the eraser points toward the keyboard. The person then accesses the individual keys with the pencil.

Keyguard: This is a plate that is made to attach over the keyboard. The computer user can touch only one key at a time. There is a hole for each key and it keeps the person from touching multiple keys if there is a lack of physical control. The computer users can actually rest their hands on the keyguard. This keyguard also has key locks that hold down a key so that only one key is pressed at a time. For example, on the Apple IIGS the shift key could be held down while pressing the question mark key.

Mouthstick or Headstick: Some adult learners access the keys by holding a mouthstick in their mouth or by a device that is attached to a headgear. Usually the keyboard is placed on a stand so that it slants upward enabling the user to see the keys more easily. The keyboard is at a better angle for striking the keys.

Stickey by C-CAD: A transparent program that allows single key typing regardless of what software is running.

Adaptive Firmware Card: Allows alternate input for those who access the standard keyboard.

Expanded Keyboard: An enlarged or mini-redefineable keyboard.

Trackball: A device used in place of a mouse.

Apple IIGS Repeat Key: This feature can be easily disengaged so that keys will not repeat until touched a second time.

Response Optimizer: An internal device for Apple computers that slows the timing on programs. Timing can be slowed to such a degree that adult learners are not aware that there is timing on the program.

Compulenz: A device that is set in front of the computer screen that enlarges print on the screen.

There are many important questions to ask or guidelines to follow when selecting software.

Guidelines for software selection

1. Print Size and Clarity of Print: Is the print size appropriate for adult learners, some of whom are visually impaired? Is there coloring or bleeding on the letters that make it difficult to see? Some software programs have not been purchased due to this problem.

2. Space Between the Lines This is probably more important than the size of the print. Adult learners with learning disabilities or perception problems have a difficult time with print that is too close together. They tend to jump from line to line.

3. Is it a good value? Does it cover more than one level? Does it cover more than one subject area? Does it include branching for the adult learner who is not mastering the material? Is it repetitive? Software is often expensive, so it is important to analyze what you are getting for your money.

4. Does it fit the curriculum needs of your program? Concentrate on a few programs that will fit nicely into your curriculum. Take time to get to know how to use the program and how it will combine with other materials.

5. Is it designed specifically for adult learners or is it a K-12 program that has been quickly adapted for adult learner?

6. Does it have simple instructions? Is the screen cluttered with all sorts of instructions and print?

7. Does the program include timing? Timing is especially troublesome to adults with physical disabilities.

8. If the program has voice output — is it understandable? Programs with synthesized voice are not as good as more expensive programs using a CD ROM. For the price, however, many of the programs that use a synthesized voice may be adequate.

9. Can this program can be used with an expanded keyboard? How many strokes are needed to answer the questions?

10. Are there new programs available that should be considered? Every catalog that arrives has new software. Keep up with the new offerings.

11. Can the software be previewed? Visit an ABE program that has a good collection of software. Ask how they use it and with whom they use it. The best information can be obtained from teachers that are using the software. In addition, most software publishers offer a trial period.

Future possibilities

The Courage Center Adult Academic Program is supported by a unique complement of professionals who are trained to address all aspects of an individual's life. Through socially validated curriculum, adult learners leaving Courage Center will have gained or relearned skills that enable them to be more independent in their communities and will have prepared them to lead healthy, meaningful lives.

In the future, the academic program should have additional space for an open lab setting. Ideally, adult learners should spend as many hours in the academic program as they wish rather than being scheduled for specific times. Academics would continue to be taught through computer-assisted instruction on Apple, MacIntosh, and IBM computers with adaptive devices provided as required.

Several gifts from the Cherne Foundation and the Eden Prairie Foundation have allowed the Adult Academic Program to expand our services with additional hardware, software, and adaptive devices. With these gifts and the support of Courage Center and Robbinsdale, we're just beginning our success story. Stay tuned for the future!

Technology for the '90s: Where We're at; Where We're Going

Claudia Bredemus
Technology for Literacy Center
St. Paul Public Schools

For the past several years, many adult literacy programs have begun to use technology with their learners. As we have read about and reviewed some of these programs, it has become apparent that "Phase I" of this endeavor is drawing to a close and visions of "Phase II" are taking hold. Changes at the Technology for Literacy Center (TLC) illustrate this progress.

Technology for Literacy Center: Phase I

Five years ago, the Technology for Literacy Center was born. Our immediate need was for staff training. Many of the teachers, volunteers, and support staff had little or no experience with computers. At TLC, Phase I of technology use can be characterized by a heavy reliance on the creativity and integrity of software vendors, much in-service training, experimentation, and faith. Convincing skeptical instructors to substitute unfamiliar software for textbooks was no easy sell.

Finding good software appropriate for adults was a second immediate task at TLC. In spite of efforts to establish standards for good software, most literacy programs agreed on only one criterion: no ducks and chicks. Software development and the knowledge of how to use technology with adults were still in their infancy.

During Phase 1, computers were used in literacy programs almost like any other media device. They often took their place between the cassette tape players and the filmstrip viewer. While using computers as an alternative media is hardly radical, it has probably been a necessary phase in literacy programs. It has given us a chance to know the machines themselves and see how students respond to them. It has given us the experience to respond to vendors' claims about the power of graphics, record-keeping, or immediate feedback. Phase I has been a learning experience for us and our students.

The dominant modes for software during the 1980's were drill and practice and word processing. The latter will, undoubtedly, continue to play an increasing role in literacy programs. Word processing is empowering, has direct application to the workplace, and can be used in a variety of creative ways. To top it off, it is inexpensive. Instructors from some ABE programs have said it is the only software they have found effective with adults.

Beyond drill and practice in the 1990s

The drill-and-practice mode will probably not maintain dominance in the '90's. There is a growing consensus that drill-and-practice routines are limiting in their capacity to stimulate higher level thinking, to encourage adults to be self-directed in their learning, and to treat subject matter holistically. At TLC, we continue to search for software like this, but in the past year, very few commercial programs have met the approval of our instructors. After a few years of working with computers, instructors have developed standards and expectations for what computers can do. Some would welcome the opportunity to develop their own software.

And that is at it should be. The responsibility for evolving into the '90's rests with educators as well as with software vendors. The design of software is one issue. The use of it is another.

Phase II will put learners in control

In order to go forward into Phase II, we will need to find new strategies for the use of technology, as well as find new technologies. The increased use of applications software (word processing, databases, spreadsheets, graphics programs, etc.) is where our future lies, according to both the K-12 literature and some of the presenters at this summer's Adult Literacy and Technology Conference. The idea is to put learners in control of the computer. To do this, we will need to create interfaces and experiences to stimulate learner interaction with these applications. The programs themselves are just tools - often difficult to learn - and we will need to develop strategies to make these tools useful for solving the real life needs our learners have.

Another responsibility we have as educators is to use the computer in different delivery systems. In response to the diversity of the populations we serve, we have primarily used computers as self-instructional tools. At TLC, for example, learners can come in at all levels at all times of the day and have immediate access to instruction. Undoubtedly, this feature will continue to play an important role in our program as we strive to meet diverse needs and schedules. But the one-on-one method of delivering instruction via computers is just one option.

Other delivery options that use technology to stimulate oral language development or critical thinking skills need exploration. Two of these possible options are small group instruction and cooperative learning. At TLC, we have used the computer in small groups to teach writing. With a computer hooked up to a large video monitor, an instructor can model the writing process by typing in ideas and content generated by the group. The group can then discuss content and revise accordingly. The entire process is modeled on the monitor and students get printouts of the finished product. Closed-captioned TV and hypermedia are other technologies that hold promise for small group instruction with adults.

Cooperative learning on the computer is also intended to foster oral language development, provide a forum for the application of prior knowledge, and encourage learners to articulate their thinking processes to each other. Software selected or developed for cooperative learning experiences should not be from the drill-and-practice mode. It should be designed to encourage multiple learning strategies and, ideally, even multiple outcomes.

Most of this is not easy. Now that we find ourselves comfortable with our Apples and PCs, we find we need staff training again to learn about scanners, creative instructional uses for databases, or hypermedia. In essence, we need to see and use the power of the computer for ourselves so we can see the possibilities for our students. Phase II may well challenge the most basic assumptions we have about teaching adults, and that is exciting.

Raise the Curtain

Polly Olson
Minneapolis Literacy Council

Whatever your position in adult literacy, you are probably out there seeking new methods, curriculum, activities, and materials to meet the needs of the learner. Sometimes you, as well as the learner, know there must be something more that can be found to reveal a new skill or concept in a way that will clear the vision.

As a coordinator of the Minnesota Literacy Council's North Side Learning center, I always look for ways that technology could assist my volunteer tutors teach basic skills to learners at a 0-to-pre-GED reading level.

The North Side Learning Center is one of four Metro Learning Centers organized by the Minnesota Literacy Council for the purpose of providing a safe, non-threatening environment for learner and volunteer tutor. Our goal is to equip each Learning Center with the necessary materials conducive to learning. We provide a lending library, supplementary materials, and basic curriculum at each Center. Two of our Centers have student computers with appropriate software for adult learners of basic skills.

The North Side Learning Center has one Apple IIGS computer. The software that we have is mostly review and reinforcement: math, vocabulary, spelling, and word families. We also have a word processor and a typing course (**Mavis Beacon Teaches Typing** by The Software Works).

We have used a teach-yourself-to-type manual with the word processor as well as the **Mavis Beacon Teaches Typing** to teach correct fingering. One learner spent a lot of extra time and went all the way through the manual, teaching herself to type. Others have had varying degrees of success, bringing up their speed, becoming more accurate, as well as having a better command of the key board as they work with some of the basic software.

A few of our learners have used the word processor for creative writing. They begin by generating sentences or responding to questions given to them by their tutor or found in some of The New Readers Press books such as Writing It Down, I Wish I Could Write, and Writing Me!

At a session at the Adult Literacy Conference in July, 1990, I heard Claudia Bredemus's pre-conference remarks on "Integrating Technology into the Curriculum." As I listened to the discussion among the participants at that symposium, I got excited as I realized others had utilized the computer by having the learner experiment with the word processor in the same way that anyone new to the computer would explore it. Learners

could make Christmas card lists, recipe files, and address books. They could write poems, jokes, notes, letters, and stories. They could also work on budgets, graphs, charts, flyers, and posters. The possibilities seem as endless as the uses of the computer. It's logical that our adult learners would have exactly the same needs and interests as the rest of the population. By using the computer for these ordinary tasks, the learner is not only mastering basic skills such as spelling and punctuation, but are gaining life skills that may carry over to home and job.

Maxine Hong Kingston, a Chinese-American author, said about her writing: "There's something in life that's a curtain, and I keep trying to raise it."

Notes from Minnesota's North Woods

John Arenz
Bemidji Public Schools

The development of technology and adult literacy in our Adult Basic Education (ABE) program spans the last decade. When I began working with ABE in 1979, the only technology supporting the programs was the telephone. By the end of that year, however, we were not only using Mr. Bell's discovery, we had also incorporated cable television into our programs. As a State-of-Minnesota pilot project, we began bringing the GED-TV tape series to the great North Woods.

The following year, our program shared quarters with a state training program that provided us access to eight PLATO terminals from Control Data Corporation. It was an enormous opportunity to become acquainted with the possibilities of computer-assisted instruction, and it spoiled the heck out of us. After getting used to the capabilities of the PLATO system, we learned that Control Data was raising the ante on terminal leasing. Sadly, we folded our high-tech tents and limped back to our shacks of reality. It wasn't until 1983 that we acquired our first microcomputer. We currently have three Apple //e micros and are impatiently awaiting the arrival of our first Apple GS.

During 1984-85, we implemented a review of ABE software for the state, the results of which were published as the Minnesota "blue book." The review used both teachers and students to field-test all available software appropriate to adult learning needs. The process provided us an excellent opportunity to become fairly well acquainted with all software with fair-to-high potential capabilities of supplementing our ABE programs.

As we moved ahead incorporating computer-assisted instruction into our adult literacy programs, we continued our involvement with GED-TV. During the early 1980s we were the only program in the state using non-cable GED-TV, a venture in which we were subsequently joined by Granite Falls, a community in southwestern Minnesota. At that point, we were definitely relying on the telephone as a high-tech teaching tool as students called us for assistance in working GED-TV workbook problems—another variation on the theme of Long Distance Learning.

Other high-tech tools that our programs now depend on include the videocassette recorders and monitors that provide our students access to educational tapes, specifically those provided through both the GED-TV and the Learn to Read series. Other tapes that have been well-received by our adult students are those that focus on issues of self-esteem. Our instructors have found that after viewing these tapes, small groups often discuss self-esteem and self-confidence, concepts that are often the real

issues for adult learners. We view these tapes as valuable instructional tools and make them available on loan from our ABE center. Additionally, we use various audio tapes to facilitate the learning of spelling, phonics, and listening comprehension skills by our English as a Second Language students.

We also have a fairly extensive collection of educational software available at our ABE center. We rely on MECC software for teaching the four Rs, Sunburst for creative thinking and problem-solving skills, and Hartley for basic skills and adaptive/remedial instruction. Various word processing programs round out our software collection. Because MECC makes its software available at relatively low cost, we use MECC programs extensively, along with a small selection of other special prupose software, including Milliken's **W.P.**, Sunbursts's **Magic Slate**, Steck-Vaughn's **Functional Reading Skills Series**, and EMC's **Steps to Spelling Breakthrough**.

Becoming fairly comfortable with the development of a moderately high-tech environment over the past ten years has raised our expectations for future possibilities of connecting technology and adult literacy. Like other social service providers, we recognize that any futuring is dollar-bound, and we attempt to keep our expectations grounded in reality. Our Community Education Department is currently involved in plans for program expansion that will create a facility to house community education, adult education, early childhood/family education, volunteer youth service, alternative diploma, and latchkey (or school-age child care) programs. Our ABE center will expand its current computer lab into a community computer center. Such a significant increase in space, along with much-hoped-for expanded hardware and software availability, would turn into reality our dream of making computer access available to the broader community here in Minnesota's north woods.

Literacy Software: Resources for ESL and Native Speakers

Marge Adkisson
Dakota County Public Library

The Technology for Adult Literacy Project (TALP) is a one-to-one tutoring program located in the Wescott Branch of the Dakota County Library in Eagan, Minnesota. This community, which is situated across the Minnesota River from the Twin Cities International Airport, is one of the fastest-growing cities in the nation. Its housing includes condominiums, apartments, and single family dwellings, most of which are upscale.

Begun in March 1988 with a matching fund grant from the St. Paul Foundation, TALP offers a combination of the Laubach tutoring method and computer software. The program is currently expanding teaching methods to accommodate non-native speakers better.

TALP learners have historically been equally divided between English as a Second Language (ESL) learners and native speakers, with an increased proportion of ESL learners recently. The native speakers have for the most part responded well to Laubach instruction. However, the rigidity of pace and presentation do obstruct learning for some people, especially learners who are optimistic about obtaining a quick fix.

The most popular software by far for native speakers is **Spellit** (Davidson), which people use with or without a tutor present. Other Davidson software, such as **Word Attack**, **Grammar Gremlins**, and **Read 'N Roll**, are helpful as skills increase. However, tutors have discovered the importance of proceeding slowly and deliberately through these exercises in order to assure mastery.

Most TALP software requires more English language familiarity than ESL beginners have. However, some tutors have used **Reading and Me** (Davidson), and to a lesser extent, **Long Vowels and Short Vowels** (both by Queue). Those programs have also proved helpful for native speakers with minimal skills, the easiest being **Reading and Me** (the only software we own which features blatantly juvenile graphics). **Discover Intensive Phonics** (H.E.C.) has proved useful for its compatibility with Laubach, as well as helping non-native speakers with hearing vowel and consonant sounds.

At present, TALP includes 21 learners, ten of whom are ESL. Since Laubach and most software is designed for English speakers, the program supplements these methods with a variety of aids for non-native speakers. In addition the Minnesota Literacy Council continues to provide us with training for ESL teachers via workshops and tapes.

Bank Street Writer: Word processor with tutorial and thesaurus. Not well used but is easy to access.

Discover Intensive Phonics: Expensive price does not include main manual nor flash cards, which are sold separately. Useful in conjunction with Laubach and for ESL-sound reinforcing.

Grammar Gremlins: Exercises and games on various levels of skill teach punctuation, plurals, possessives, parts of speech, etc. Easy access, but green/purple text sometimes nearly illegible.

Homonyms: User-friendly program. Learner types correct word after distinctions are clearly given.

Long Vowels: Exercises to choose correct sounds are written in green/purple type. For ESL learner use, tutor must be present.

Masterspell: Awkward when computer has only one disk drive because it requires interchanging learner and program disks. Allows design of lists to meet individual needs.

Multiple Meaning: Explanation of meaning differences appears on screen; context used for clues. Good for comprehension practice.

My Words: Requires formatted learner disk to keep records of words used. Learner's words retained in cumulative list.

101 Misused Words: For more advanced learners seeking greater accuracy in word choice. Green/purple type; some incorrect hyphenation (e.g., "mi-ne!")

Read 'N Roll: Multiple-choice exercises to improve reading for facts, main idea, sequence and inferences. Great for comprehension.

Reading and Me: Very elementary word recognition requires some English comprehension. Intended for children beginning to read.

Reading and Thinking I: Comprehension skills should be sharpened, except for the fact that some exercises seem to have two possible correct answers.

Short Vowels: Exercises to choose correct sounds written in green/purple type. For ESL learner, tutor must be present.

Spellit: Exercises and popular game uses 10,000 often misspelled words, some addressing specific mistakes. Allows use of learner disk. Slower speed on older computers less frustrating.

Word Attack: Various activities to practice 700+ vocabulary words on ten levels of difficulty.

Working with Antonyms: Unimaginative exercises picking antonyms from list of three. Allows adding new sentences to existing data.

Working with Synonyms: Unimaginative exercises choosing synonyms from list. Allows adding new sentences to existing data.

Experience has taught us that documentation does not always match the software it is intended to describe. For example, all Davidson software incorrectly instructs user to "insert data disk" instead of "turn disk over."

Despite these frustrations, our ESL learners and tutors enjoy using the software and computers, and the Technology for Adult Literacy Project continues to grow.

PALS in Rochester

Cindy Rabe
Rochester Adult Basic Education Center

In the winter of 1987, our staff felt the need to find a better way to teach non- to low-level reading adult basic education learners. Our learner-teacher ratio had been ten-to-one, but because of learners' inability to read, it was often difficult to meet individual needs. To help maximize our staff's capabilities, we installed a **Principle of the Alphabet Literacy System (PALS)** program.

PALS is designed to help teach non-reading adults and at-risk adolescents to read and write better. To qualify for the **PALS** program, the learner must be reading at a fifth-grade-level or below. The program, written by Dr. John Henry Martin, runs on IBM computers using Infowindow monitors to access interactive videodiscs.

The Rochester Adult Basic Education Center was chosen as a pilot site for **PALS** during the development phase; we sent monthly reports and from our input, as well as from the input of other pilot sites, the revised software was written.

Since then, over 700 sites have begun using the **PALS** program. Seven **PALS** sites are located in Minnesota. One of them, Farnsworth Adult Education in St. Paul, began to use **PALS** at approximately the same time we did.

In the first phase of the program, learners press the screen to control the computer, with no need to use the keyboard. In the second phase of the program, learners use the keyboard, a skill which gives them pride. Adding to this sense of pride is the fact that the computer lab is set up more like an office than a traditional classroom.

The first phase of the program explores the Invention of the Alphabet. The learner listens to a story in which all of the phonemes and graphemes of the English language are presented.
During phase two, the learner writes in a work journal (workbook) to begin matching phonemes and the symbols that represent them to form words. The work journal follows a sequential progression from individual sounds to words to phrases to sentences and finally to paragraphs.

The computer will accept phonetic responses and then shows the student how the words are written in "book look" form. The computer will also sense if the learner needs additional help and will divide the sentence into phrases, words or even sounds. An interesting feature of the PALS program is the "talking mouth": a video segment on which a human mouth forms the sound so the learner can perceive the sound visually as well as

aurally. By the time learners finish the work journal, they should be able to write anything they can say.

In the third phase, the learner moves into personal writing, writing many stories and learning self-editing. Through the use of a personal dictionary developed in Rochester and used nationwide, as well as a published dictionary, the learner transfers the sound of words into writing. It is one of the most exciting pieces of the program to watch non-writers become beginning writers as they learn to write their thoughts and express themselves.

Another skill acquired by students in the **PALS** program is typing. The final step of the **PALS** program is collecting and filling out job applications and creating a job resume.

We structured our **PALS** lab by starting with one class, one teacher, and six learners meeting two hours a day, three days a week. All of these first learners have completed the program. Since then, our **PALS** program has served a wide variety of students: English as a Second Language (ESL), Adult Basic Education (ABE), physically and emotionally handicapped, learning disabled, and special education students. Our clients have ranged in age from 14 to 72.

We have also served two students with severe hearing limitation. One of our tutors developed an apparatus to plug into the headphone jack on the computer. The learner places the apparatus around his or her neck and turns on the telephone switch of his hearing aid, which allows the learner to focus on the computer audio track while filtering out all background noise. One of our deaf learners has progressed from being a non-reader to fluency in reading and writing.

One benefit of the **PALS** lab is that we can serve sixteen learners simultaneously, yet meet each learner's individual needs. In conjunction with the St. Paul Adult Education program, we publish a national monthly newsletter designed to allow **PALS** learners to have a forum in which to publish their writing. Our circulation has grown from 250 copies to 1500 copies distributed throughout the United States and Canada.

Recently we have chosen to serve another population using the same computers. We are presently previewing programs to take our advanced Adult Basic Education and GED students from their entrance level through the GED.

We have enjoyed watching our non-traditional approach succeed with our non-traditional learners. Perhaps individualization is a key to helping our learners progress in their goals from "learning to read to be able to get by" to "learning to read by use of the computer and now wanting to explore a career using computers."

[Cindy Rabe is a paid consultant for IBM, publisher of **PALS**.]

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Software and Hardware List

The following software is mentioned in articles in this monograph.

SOFTWARE	VENDOR	ARTICLE
Smart Words	Addison Wesley	Fredrickson
Bank Street Writer	Broderbund	Fredrickson
Printshop	Broderbund	Willette
Printshop	Broderbund	Fedje
Appleworks	Claris	Kaufer
Appleworks	Clazris	Berg
Grammar Gremlins	Davidson	Adkisson
Read N Roll	Davidson	Adkisson
Reading and Me	Davidson	Adkisson
Speed Reader II	Davidson	Fredrickson
Spell It	Davidson	Adkisson
Spell It	Davidson	Fredrickson
Word Attack	Davidson	Adkisson
Word Attack Plus	Davidson	Fredrickson
Construct-a-Word	Development Learning Materials	Kaufer
Hint-and-Hunt	Development Learning Materials	Kaufer
Syllasearch	Development Learning Materials	Kaufer
CORE	Educational Activities	Fedje
Steps to Spelling Breakthrough	EMC	Arenz
Basic Word	Fleishman(Hacienda La Puente)	Fedje
Discover Intensive Phonics	H.E.C.	Adkisson
Discover Intensive Phonics	H.E.C.	Fedje
Discover Intensive Phonics	H.E.C.	Willette
My Words	Hartley	Kaufer
Wordprocessing	Hartley	Arenz
AESOP	Humanities Software	Kaufer
Cloze Plus	I/TC	Kaufer
Guided Reading	I/TC	Kaufer
Word Perfect	IBM	Fredrickson
Textbook Marking Strategies	(Mikuleky)The Learning Skills Center	Fredrickson
Tip.. for College Test Taking	(Mikuleky)The Learning Skills Center	Fredrickson
Masterspell	MECC	Berg
Study Guide	MECC	Berg
Typing Tutor	MECC	Berg
Comprehension Connection	Milliken	Fredrickson
Comprehensive Connection	Milliken	Fedje
Wordprocessing	Milliken	Arenz
Developing Reading Power	Mindscape	Fedje
Electric Flash Card	public domain	Berg
Long Vowels	Queue	Adkisson
Short Vowels	Queue	Adkisson
Grammatik	Reference Software	Fredrickson

SOFTWARE	VENDOR	ARTICLE
Functional Reading Skills Series	Steck Vaughn	Arenz
Magic State - Wordprocessing	Sunburst	Arenz
The Factory	Sunburst	Fedje
Mavis Beacon Teaches Typing	The Software Works	Olson
Basic Skills Series	Wordware Publishing	Berg
Computer Monopoly		Willette
Job Seeking Skills		Willette

Vendor List

Addison Wesley Publishing Co.
2725 Sand Hill Road
Menlo Park, CA 94025

Apple Computer Co.
2025 Mariani Ave.
Cupertino, CA 95014

Broderbund Software
Software Direct
P.O. Box 12947
San Rafael, CA 94913-2947

The Center for Computer Assistance To
The Disabled (C-CAD)
2501 Ave. J. Suite 100
Arlington, TX 76006

Claris Corporation
Patrick Henry Dr. Box 58168
Santa Clara, CA 95052-8168

Computer Curriculum Corporation (CCC)
1287 Lawrence Station Rd.
Sunnyvale, CA 94089

Computer Systems Research (CSR)
Avon Park S. P.O. Box 45
Avon, CT 06001

Davidson & Associates
3135 Kashiwa St.
Torrance, CA 95050

Developmental Learning Materials (DLM)
One DLM Park
Allen, TX 75002

Educational Activity, Inc.
P.O. Box 392
Freeport, NY 11520

John Fleischman
Hacienda La Puente
211 W. Temple, Room 808
Los Angeles, CA 90012

H.E.C. Software, Inc.
3471 S. 550th W.
Bountiful, UT 84010

Hartley Courseware, Inc.
133 Bridge St. P.O. Box 419
Dimondale, MI 48821

Humanities Software
P.O. Box 950
Hood River, OR 97031

Instructional/Communication
Technology (I/TC)
10 Stepar Place Huntington Station
New York, NY 11746

IBM Corporation
4111 Highway 52 North
Rochester, MN 55901

The Kentucky Network (KET)
2230 Richmond Road
Lexington, KY 40502-1311

The Learning Skills Center
Indiana University
316 N. Jordan Ave.
Bloomington, IN 47405

L&S Computerware
Mindscape, Inc.
3444 Bridge St.
Northbrook, IL 60062

Minnesota Educational Computing
Consortium (MECC)
3490 Lexington Ave. N.
St. Paul, MN 55126

EMC
Changing Times Educational Services
300 York Ave.
St. Paul, MN 55101

Milliken Publisher Company
St. Louis, MO 63132-0579

New Readers Press
1320 Jamesville Ave. Box 131
Syracuse, NY 13210

Queue
562 Boston Ave.
Bridgeport, CT 06610

Reference Software, Inc.
330 Townsend Suite 123
San Francisco, CA 94107

The Software Works
19808 Nordhoff Place
Chatsworth, CA 91311

Steck-Vaughn Company
P.O. Box 2028
Austin, TX 78768

Sunburst
Room DN7
39 Washington Ave.
Pleasantville, NY 10570-9971

The Roach Organization (TRO)
4660 W. 77th Street
Edina, MN 55435

Wordware Publishing
1506 Capital Ave.
Plano, TX 75074